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ABSTRACT

The learning effect of instructional objectives treatment in economics was tested by seeing if significant differences existed in mean achievement scores of the economic understanding of students using the treatment and those with no treatment. During the 1970 fall semester, 300 students from three community colleges in California (Cypress, Mount San Antonio, and Orange Coast) participated in this study. The evaluative instrument used was the "Test of Economic Understanding, Form B." Information was provided concerning student characteristics and comparisons of: post-test differences, pre-tests for group differences, pre-test to post-test gain differences, and pre-tests for withdrawal effects. The overall conclusion is that instructional objectives do produce definite learning effects, though the level of significance may be less than sufficient to justify efforts and resources used for such teaching methodology. Additional research is needed to further test the effects of instructional objectives. A copy of the instructional objectives is available, upon request, from the author, Cypress College, California. (CA)

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INSTRUCTIONAL OBJECTIVES AND ECONOMIC UNDERSTANDING

Introduction to the Study

What is "economic understanding," [1] and how do we know when a student has attained a "satisfactory level" of such learning? Further, what teaching methodologies are most efficient in attaining this goal for our students? Do we, as teachers of economics, define clearly for our students what concepts they must master to achieve economic understanding, and do we know what sub-concepts are essential in mastering different levels of learning? [2]

All of these questions must surely confront and confound any teaching economist facing his students, and were in fact the very questions spurring this research study. For in the literature of education high praise is often paid the use of "instructional objectives" in achieving learning goals by such authorities as Glaser, [3] Kapfer, [4] Krathwohl, [5] Gagné, [6] and Mager. [7] Learning is to be much improved if learning goals are clearly stated to the student. Specifically, such statement should include (a) the situation in which the learning behavior is to occur, (b) a precise description of the behavior expected,(c) the object or goal of behavior, and (d) a specified criterion performance level. Indeed, high claims are made for learning improvement via the use of instructional objectives, regardless of instructional area.

It would perhaps be expected, given such claims, that a survey of the literature (both in education and economic education) would thus turn up many research studies on both the design and learning effect of instructional objectives. [8] This expectation, however, is far off the mark. For few research studies have been completed to test the learning effect of instructional objectives. [9] This dearth of research reporting is summed up pointedly by Eisner when he states that: [10]

> What of the research on educational objectives?...A number of questions can be asked about educational objectives that are in principle amenable to empirical study....
>
> When one looks for research on these questions, one soon finds that for the most part they have been neglected...In view of the admonitions in curriculum literature to state objectives in behavioral terms, it is surprising to find such a paucity of empirical studies available.

Such research deficiency would be of little concern were it not that improvement of economic understanding may be viewed as strongly dependent upon such research. The importance of such instructional objectives is noted by Joseph in summary of a meeting designed to improve the teaching of economics: [11]

> After the stimulating discussion at the Merrill Center, I am firmly convinced that there is a strong need for a critical evaluation of the objectives of the basic economics course. Without an explicit goal to use as a standard, these courses can range from pallid discussions of current events to non-functional exercises in applied mathematics.

To further add emphasis to the need for instructional objectives research, especially as related to economics instruction at the community college level, the Thompson/Walthall/Merson Report clearly calls attention to such deficiency: [12]

> A review of published objectives in economics education concludes that accepted definitive statements as to the specific educational intents of economics instruction are lacking and that little can be accomplished in improving economics education until spedific behavioral objectives attuned to the junior college setting can be formulated.
>
> Economists often disagree on instructional objectives. However, it is axiomatic that we cannot select course content or evaluate the effectiveness of differing instructional practices until agreement is reached on the level of achievement we expect students to attain. Preparation of acceptable lists of behavioral objectives stated in measureable terms must proceed any experimentation with the instructional process.

The Research Study

Given the preceeding introductory comments, the problem to be researched was that the learning effect of instructional objectives treatment was undetermined. In order to research such effect, two null hypotheses were set up:

1. Ho_1: There will be no significant difference (Z=.05; 1-tail) in mean achievement scores of economic understanding at end of course instruction between selected community college students receiving treatment of instructional objectives (experimental groups) and those receiving no treatment (control groups).

2. Ho_2: There will be no significant difference (Z=.05; 1-tail) in changes of mean achievement scores of economic understanding from beginning to end of course instruction between selected community college students receiving treatment of instructional objectives (experimental groups) and those receiving no treatment (control groups).

By testing such hypotheses, the effect of instructional objectives on learning outcomes would be measured in terms of final scores (Ho_1) and gains in scores from pre-test to post-test means (Ho_2).

Perhaps the most important step in conducting the research was the development of a list of instructional objectives. The goal was to construct a list which was specific enough to elicit learning gains from the student, yet be general enough to be acceptable to a range of participating colleges and economists. Such a list was constructed for the one-semester "survey" course of economics principles via reference to the Task Force Report,[13] the Thompson/Walthall/Merson Report, [14] a wide variety of Joint Council On Economic Education literature, and a Participating Group of community college economists at the Center For Economic Education in California State College, Fullerton. (This list is available upon request from the author.)

In conjunction with development of the instructional objectives list, the Test Of Economic Understanding (TEU - Form B) [15] was chosen as the evaluative instrument. The TEU appeared most appropriate for a one-semester "survey" economics course, was easily administered and accepted by participating economists, and was nationally-normed for comparative purposes. [16] The

research design incorporated the TEU on both a pre-test and post-test basis, so as to test the null hypotheses previously described.

The research design, and treatment of instructional objectives itself, involved three community colleges in Southern California (Cypress, Mount San Antonio, Orange Coast) with some 300 economics students, and was conducted during the Fall semester of 1970. In each college a control group was taught by traditional methodology, while the experimental group received copies of the instructional objectives and were periodically tested (programmed basis) as to their performance at criterion level. Both groups were taught with similar texts, meeting times, rooms, etc. by the same instructor so as to reduce "contributory factors" to learning results other than instructional objectives. And both groups in all colleges received a pre-test and post-test, using the TEU instrument (See Table II).

Test Findings
and Conclusions

As an overall summary of test results, one can say that instructional objectives do produce definite learning effects, though the level of significance may be less than that deemed sufficient to justify efforts and resources to such teaching methodology. And an overall conclusion would be that additional research is needed to test instructional objectives effect, especially with research design regard to possible "impurities" encountered in this study and described below.

To show the effect of instructional objectives on end-of-semester learning, Table I compares post-test results of control and experimental groups. While results vary among colleges, the overall difference of a Z-score of +1.54 gives a .06 level of significance to instructional objectives treatment. Such a result is perhaps "fair" for new instructional methodologies, but was not sufficient to reject Ho_1 at the required .05 level of significance. Therefore, this research study would point to definite learning improvement from instructional objectives

TABLE I

COMPARISON OF POST-TEST DIFFERENCES

	Post-Test Experimental Group			Post-Test Control Group			Difference of Experimental Minus Control Group Means	Z-Score of Difference (1.65 needed For .05 Level Of Significance)
	Mean	N	SD	Mean	N	SD		
All Colleges	31.8	92	6.59	30.4	112	6.25	+1.4	+1.54
Cypress College	28.7	27	6.06	29,2	44	6.47	-0.5	-0.34
Mount San Antonio College	29.9	22	5.56	29.6	38	5.66	+0.3	+0.20
Orange Coast College	34.7	43	6.26	33.1	30	5.84	+1.6	+1.10

treatment, but would caution against large resource allocation for such purposes until further research could substantiate test results.

Tables II and III tabulate data used to test Ho_2, as gains in scores from pre-test to post-test averages are compared. While one might well expect any student in any economics course to improve in economic understanding over a semester period, the objective here was to compare relative rates of gain between control and experimental groups. On this basis Ho_2 was soundly accepted (A Z-score of -.13.), and no significant effect is evidenced by Table II. Table III gives the same "no significant effect" finding though in a slightly different manner, in that Z-score differences themselves were compared. While there were obvious gains in economic understanding (Z-scores ranged from +2.24 to +8.16, though only +1.65 was necessary for a .05 level of significance.), experimental groups show no significant gains over control groups.

The lack of significant effect from instructional objectives on Ho_2 is somewhat mitigated, however, by inspection of Table IV. For an examination of pre-test averages revealed a most "unplanned" research design impurity: Experimental groups had significantly higher pre-test means than control groups. Of course, the implication of a higher pre-test mean on Ho_2 was that the amount of gain from pre-test to post-test would tend to be reduced, and thus lower significant effects on testing Ho_2 (It does appear rather suprising that Ho_1 would have a .06 significance level, while Ho_2 had only a .13?). In this same vein, another test "impurity" (Though inherent, as instructors determine their own class conduct.) arose because participating economists weighted post-test results differently in computing semester grade results. As might be expected, the college scoring highest on the post-test was the one in which the instructor considered the post-test score as the final exam grade, while the college scoring lowest was that in which the economist used the post-test simply as a "warm-up" to finals with no grade credit. - The age-old conclusion is that grades do produce significant results?

TABLE II

COMPARISON OF PRE-TEST TO POST-TEST

GAIN DIFFERENCES

	Pre-Test to Post-Test Gain, Experimental Group			Pre-Test to Post-Test Gain, Control Group			Difference of Experimental Minus Control Group Means	Z-Score of Difference (1.65 needed For .05 Level of Significance)
	Mean	N	SD	Mean	N	SD		
All Colleges	+5.3	92	5.54	+5.4	112	5.43	-0.1	-.13
Cypress College	+3.7	27	5.18	+4.3	44	5.36	-0.6	-.48
Mount San Antonio College	+3.8	22	4.52	+5.4	38	5.01	-1.6	-1.27
Orange Coast College	+7.1	43	5.82	+7.0	30	5.54	+0.1	+.07

TABLE III

COMPARISON OF PRE-TEST TO POST-TEST

GAIN DIFFERENCES

	Pre-Test Score			Post-Test Score			Difference of Post-Test Minus Pre-Test Scores	Z-Score of Difference (1.65 needed For .05 Level of Significance)
	Mean	N	SD	Mean	N	SD		
All Colleges: Experiment								
All enrolled	25.5	135	6.27	31.8	92	6.59	+6.3	+7.16
Completed	26.5	92	5.91	31.8	92	6.59	+5.3	+5.70
Control								
All enrolled	24.2	172	6.25	30.4	112	6.25	+6.2	+8.16
Completed	25.0	112	6.16	30.4	112	6.25	+5.4	+6.51
Cypress College: Experiment								
All enrolled	23.6	43	6.31	28.7	27	6.06	+5.1	+3.45
Completed	25.1	27	6.02	28.7	27	6.06	+3.6	+2.29
Control								
All enrolled	23.9	84	6.24	29.2	44	6.47	+5.3	+4.42
Completed	24.9	44	5.91	29.2	44	6.47	+4.3	+3.21
Mount San Antonio College Experiment								
All enrolled	25.6	33	5.13	29.9	22	5.56	+4.3	+2.83
Completed	26.1	22	5.49	29.9	22	5.56	+3.8	+2.24
Control								
All enrolled	23.7	55	5.91	29.6	38	5.66	+5.9	+4.96
Completed	24.2	38	5.78	29.6	38	5.66	+5.4	+4.29
Orange Coast College: Experiment								
All enrolled	26.9	59	6.44	34.7	43	6.26	+7.8	+6.00
Completed	27.7	43	5.86	34.7	43	6.26	+7.0	+5.22
Control								
All enrolled	25.8	33	6.54	33.1	30	5.84	+7.3	+4.59
Completed	26.2	30	6.66	33.1	30	5.84	+6.9	+4.18

TABLE IV

COMPARISON OF PRE-TESTS FOR

GROUP DIFFERENCES

	Pre-Test, Experimental Group			Pre-Test Control Group			Difference of Experimental Minus Control Group Pre-Test	Z-Score of Difference (1.65 needed For .05 Level of Significance)
	Mean	N	SD	Mean	N	SD		
All Colleges:								
All enrolled	25.5	135	6.27	24.2	172	6.25	+1.3	+1.81
Completed	26.5	92	5.91	25.0	112	6.16	+1.5	+1.76
Cypress College:								
All enrolled	23.6	43	6.31	23.9	84	6.24	-0.3	-0.25
Completed	25.1	27	6.02	24.9	44	5.91	+0.2	+0.14
Mount San Antonio College:								
All enrolled	25.6	33	5.13	23.7	55	5.91	+1.9	+1.57
Completed	26.1	22	5.49	24.2	38	5.78	+1.9	+1.27
Orange Coast College:								
All enrolled	26.9	59	6.44	25.8	33	6.54	+1.1	+0.76
Completed	27.7	43	5.86	26.2	30	6.66	+1.5	+0.97

Tables V and VI list additional research generated as side effects in testing Ho_1 and Ho_2, and compare withdrawal rates, age, and entrance test scores (as made available by participating colleges). It should be noted that an initial assumption was made of random student enrollment (An assumption dubious in light of Table IV.), and test results were assumed to be the effect of instructional objectives only. While some of the data in Tables V and VI is inconclusive (ACT/SCAT scores were not available for many students.) at best, it did not appear that such student characteristics would have affected test results to any significant degree.

Summary

In light of the introductory statements made regarding the deficiency of research on instructional objectives effect, perhaps a modest claim may be made for some contribution by this research study. While the specific null hypotheses set were both accepted at the .05 level of significance (And, therefore, a significant effect claim could not be made.), a .06 level of significance was achieved on Ho_1, and test "impurities" may have impaired the test on Ho_2. Given the educational literature theorizing the learning gains from use of instructional objectives, and reviewing the test findings of this research study, it would appear that further research on instructional objectives effect is both necessary and desirable.

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TABLE V

COMPARISON OF PRE-TESTS FOR

WITHDRAWAL EFFECTS

	Pre-Test, All enrolled			Pre-Test, Completed			Difference of Completed Minus All enrolled Pre-Test	Z-Score Difference (1.65 needed For .05 Level of Signifi-cance)
	Mean	N	SD	Mean	N	SD		
All Colleges:								
Experiment	25.5	135	6.27	26.5	92	5.91	+1.0	+1.22
Control	24.2	172	6.25	25.0	112	6.16	+0.8	+1.07
Cypress College:								
Experiment	23.6	43	6.31	25.1	27	6.02	+1.5	+1.02
Control	23.0	84	6.24	24.9	44	5.91	+1.0	+0.88
Mount San Antonio College:								
Experiment	25.6	33	5.13	26.1	22	5.49	+0.5	+0.33
Control	23.7	55	5.91	24.2	38	5.78	+0.5	+0.42
Orange Coast College:								
Experiment	26.9	59	6.44	27.7	43	5.86	+0.8	+0.65
Control	25.8	33	6.54	26.2	30	6.66	+0.4	+0.24

TABLE VI

STUDENT CHARACTERISTICS

	Age		Withdrawal			ACT or SCAT Scores	
	Mean (yrs.)	N	Start	End	% Drop (%)	N	Score
Cypress College:							
Experiment	19.4	43	43	27	37.2	14 20	29.3 - SCAT(%ile) 17.7 - ACT (%ile)
Control	19.5	84	84	44	47.6	24 51	33.0 - SCAT(%ile) 17.3 - ACT (%ile)
Mount San Antonio College:							
Experiment	19.9	33	33	22	33.3	24 3	288.5 - SCAT(Total) 19.3 - ACT (%ile)
Control	20.2	55	55	38	30.9	30 4	298.3 - SCAT(Total) 19.8 - ACT (%ile)
Orange Coast College:							
Experiment	21.6	59	59	43	27.1	50	53.6 - ACT (Total %ile)
Control	20.5	33	33	30	9.1	--	---
All Colleges:							
Experiment	20.5	135	135	92	31.9	--	---
Control	19.9	172	172	112	34.9	--	---
Combined	20.2	307	307	204	33.6	--	---

Bibliography

1. A complete definition of economic understanding would best be answered by reference to the list of instructional objectives prepared for use in this research study. However, the basic meaning is the knowledge of, and ability to apply, economic concepts and patterns of economics logic/reasoning. An analytical approach to, and comprehension of, public economic issues is both the definition of economic understanding, and the goal of economics instruction as approached in this research study.

2. For a complete discussion of such "levels" of learning see Bloom, Benjamin S., ed., Taxonomy Of Educational Objectives: The Classification Of Educational Goals, Handbook I: Cognitive Domain. New York: David McKay Co., 1956.

3. Glaser, Robert, "Objectives and Evaluation: An Individualized System." Science Education News (June 1967), Reprint.

4. Kapfer, P.G., "Behavioral Objectives: Cognitive and Affective Domains." Education Screen Audio-Visual Guide 47 (July 1968), 10-11.

5. Krathwohl, David R., "Stating Objectives Appropriately for Program, for Curriculum, and for Instructional Materials Development." The Journal Of Teacher Education 16 (March 1965), 83-92.

6. Gagné, Robert M., "The Analysis of Instructional Objectives for the Design of Instruction." Teaching Machines And Programmed Learning, II: Data And Directions. Wash., D.C.: Dept. of Audio Visual Instruction - N.E.A. (1965), 21-65.

7. Mager, Robert F., Preparing Objectives For Programmed Instruction. Palo Alto, Calif.: Fearon Publishers, 1967.

8. Perhaps an interesting illustration of the deficiency of research on instructional objectives was the annual list of reported dissertations in progress/just completed, as stated in the August/September 1970 issue of the Junior College Journal. Of the 338 dissertations listed, only three (including this study) specifically appeared to deal with instructional objectives.

9. Another illustration of such deficiency was provided by examination of the 246 studies added in 1970 to the NYU Research In Economic Education (George Dawson, director. Research In Economic Education. New York: New York University Center For Economic Education - 1970 Supplement.). Of the 246 titles, only 14 made specific reference to testing of learning achievement outcomes, and of these only 4 made specific reference to instructional objectives as an integral component of the study.

10. Popham, W. James, Eisner, Elliot W., Sullivan, Howard J., Tyler, Louise L.. Instructional Objectives. Chicago, Ill.: Rand McNally & Company, 1969 - American Educational Research Association Monograph Series On Curriculum Evaluation, No. 3, 10-13.

11. Joseph, Myron L., "Note on Course Objectives," in Knopf, K.A., Strauss, J.H., eds., The Teaching Of Elementary Economics. New York: Holt, Rinehart & Winston (1960), 194-196.

12. Thompson, Fred A., Walthall, W.A., Merson, T.B., Economic Education In California Junior Colleges: An Exploratory Study. Wash., D.C.: U.S. Office of Education (1967), 10, 26. This study was initially financed by the California Junior College Association, and was developed into a study grant proposal of some $400,000 submitted to USOE.

13. National Task Force On Economic Education, Economic Education In The Schools. New York: Committee for Economic Development, 1961.

14. Thompson, Walthall, Merson, Op. Cit., see last chapter on recommendations and conclusions.

15. TEU is published by, and available from, Science Research Associates, Inc., 259 Erie Street, Chicago, Illinois, 60611. - Reorder #7-2860.

16. An example of such comparative uses of TEU would be reference to Gable, Myron, "The Economic Understanding of Top Level New York Business Executives," The Journal Of Economic Education 2 (Spring 1971), 179-180.